

A Clinical Study on Management of Complications of Chronic Suppurative Otitis Media

A. Naga Raju¹, T. Maheshwari Rani², K. Ramesh³, A. S. Aruna Kumari⁴

¹ Assistant Professor, Government ENT Hospital, Osmania Medical College, Hyderabad

² Assistant Professor of ENT, Osmania Medical College, Hyderabad

³ Assistant Professor, Government Medical College, Nalgonda, Telangana

⁴ Associate Professor, Government ENT Hospital Koti, Osmania Medical College, Hyderabad

Received: 03-11-2021 / Revised: 23-11-2021 / Accepted: 14-12-2021

Corresponding author: Dr. AS Aruna Kumari

Conflict of interest: Nil

Abstract

Background: The incidence of complications of CSOM is high in tropical countries like India. Various factors like low living conditions, over-crowding, low personal hygiene, and importantly low economy play an important role. The aim of the study is mainly to find out the incidence of various complications of CSOM.

Methods: This cross-sectional study was conducted in the Department of ENT and Head & Neck Surgery, Government General Hospital, Kurnool Medical College, Kurnool. The ear was examined for the presence of scanty discharge, flakes or crusts adjacent to the tympanic membrane, presence of polypi, granulations, Cholesteatomas. Mastoid tenderness was elicited over the Macewans triangle, mastoid tip, and posterior border of the mastoid process.

Results: Total number of patients with COSM attending ENT OP was n=18,100 and the total number of patients admitted in the ENT Department during the study period with intra and extracranial complications was n=40 which is 0.22 percent. The common pathology of the middle ear was granulations and cholesteatoma in n=18(45%) cases both were found in n=10(25%) and polyp were found in n=4(10%) of cases.

Conclusion: With the advent of newer diagnostic modalities which include CRT/MRI, culture and sensitivity, and use of proper antibiotics and early interventions the incidence of complications can be still reduced. However, the only limitations are ignorance, poverty, and illiteracy which results in the delayed seeking of medical care contribute to the incidence of complications.

Keywords: Chronic suppurative otitis media (COSM), Complications, intracranial complications, extracranial complications.

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Chronic suppurative otitis media (COSM) is a condition of chronic inflammation of the middle ear and mastoid cavity. It may manifest itself with chronic recurrent ear discharge through a perforated tympanic membrane. Chronic infection and

inflammation will lead to polyp and cholesteatoma formation which continue to destroy the bony margins and progress to various complications of COSM. [1] Patients with tympanic perforations who continue to discharge mucoid material from

6 weeks to 3 months are recognized as cases of COSM. [2] As per the WHO guidelines diagnosis of COSM requires 2 weeks of otorrhoea. [3] whereas otolaryngologists adopt a higher duration of 3 months. [4] The prevalence of COSM is approximately 65 – 330 million annually. The majority of the burden is in Southeast Asian countries and African countries. India has also been shown to present the highest prevalence of COSM with a rate of >4%. [5] There is a general decline in the rate of complications however, they are still noticed in many cases. The possible causes include poor socioeconomic conditions, lack of education and awareness. Many still consider middle ear discharge to be a nuisance rather than a potentially dangerous condition. [6] The complications of chronic otitis media are classified into two groups based on anatomy. Intra temporal complications include mastoiditis, petrositis, facial paralysis, and labyrinthitis. The intracranial complications include extradural abscess, subdural abscess, meningitis, and brain abscess. An Otoscopic examination of COSM patients will reveal the middle ear to be red in color and inflamed with purulent discharge often present. The bacteria in COSM may be aerobic (*Pseudomonas aeruginosa*, *Escherichia coli*, *S. aureus*, *Streptococcus pyogenes*, *Proteus mirabilis*, *Klebsiella species*) or anaerobic (*Bacteroides*, *Peptostreptococcus*, *Propionibacterium*). [7-9] Among these organisms *P. aeruginosa* is responsible for most cases of and the progressive destruction of the middle ear and mastoid structures. COSM cases with cholesteatoma will require surgical management with mastoidectomy to prevent intracranial complications. Cholesteatoma left alone will ultimately erode tegmen and cause complications. Cases in which the administration of antibiotics does not cause a decrease in symptoms are the candidates with complications. Hearing impairment is one

of the commonest sequels of COSM. [10] If intracranial complications are developed danger clinical signs of headache, fever, vomiting, drowsiness, and visual field defects may be initially seen. Mortality due to complications of COSM is generally high than other types of COSM. [11, 12] Most of the cases of fatality occur to intracranial complications like meningitis or brain abscess. [13-15] With this background we in the current study tried to evaluate the various modes of clinical presentation of cases of COSM with clinical, radiological bacteriological correlation and incidences of complications of COSM in the group of patients presenting to our tertiary care center for treatment.

Material and Methods:

This cross-sectional study was conducted in the Department of ENT and Head & Neck Surgery, Government General Hospital, Kurnool Medical College, Kurnool. Institutional Ethical committee permission was obtained for the study. Written consent was obtained from all the participants of the study.

Inclusion criteria:

1. Cases diagnosed as COSM clinically and radiologically
2. All the patients came with the complaint of profuse ear discharge, deafness, headache, severe otalgia, fever, nausea, and vomiting along with CNS signs such as ataxia, visual defects, dizziness.
3. Those with swelling behind the ear.
4. Both male and female cases.

Exclusion criteria:

1. Patients diagnosed with Acute otitis media.
2. Those who do not fit in inclusion criteria
3. Those who were not willing to participate in the study
4. Those not available for future follow-up.

All the selected cases were subjected to detailed history including History of trauma, sinus infection, nasal infection, and throat infections. Prior history of any illness was taken to corroborate the present condition. Previous treatment with antibiotics and surgery was also enquired and noted. After a routine general examination, a detailed local examination was carried out in every case. Even if only one ear is affected, both ears were examined, since the condition of the opposite ear, often yields valuable clues about the pathology of the affected ear. The throat and nose were examined for any associated conditions. The ear was examined for the presence of scanty discharge, flakes or crusts adjacent to the tympanic membrane, presence of polypi, granulations, Cholesteatomas. Mastoid tenderness was elicited over the Macewans triangle, mastoid tip, and posterior border of the mastoid process. Discharge was noted for its nature, amount, smell, color, and presence of reservoir sign. The tympanic membrane was examined for congestion, retraction or bulging, opacities, and perforation - site, type, size, single or multiple. In all the cases the Eustachian tube patency was tested, and hearing is recorded in both ears. In all cases, neck examination is done as routine. The following investigations were carried out in every case, first, the ear was examined using a Seigle speculum which gives a two-fold magnification for the presence of mobility of drumhead, retraction pockets, cholesteatomas matrix in a hidden attic or marginal defect, and fistula sign. Eustachian tube patency tests were done to evaluate the presence of communication with the Eustachian tubes. An aural swab for culture and sensitivity was done in all cases. After thorough aural toilet normal routine hearing tests were carried out. Any difference of hearing before and after tubal inflation was noted. Tuning fork tests and air and bone conduction audiograph were

done, to indicate the type and degree of hearing loss, cochlear reserve, and extent of ossicular mobility and integrity. Radiography to demonstrate the cellularity or otherwise of the mastoid to demonstrate a cavity and the position of the lateral sinus and the tegmen tympani. X-ray of PNS was also taken to exclude infection in the sinuses. Granulations and aural polyp curetted out and the cholesteatoma mass removed from the attic or antrum, at the time of operation, sent for histopathological examination. CT scan with and without enhancement is done for intracranial complications to make out the lesion. In every case blood examination was carried out for hemoglobin, total count, and differential count, urine examination was done for albumin, sugar, and deposits. All cases were managed initially with systemic antibiotics and attention paid to local neurological pathology by referring to a neurosurgeon. Treatment of ear pathology is dealt with after two weeks to two months of resolution of local complication. All cases were subjected to surgery with a preoperative operation. The cases were treated by either simple cortical mastoidectomy or modified or radical mastoidectomy with a canal down procedure with wide meatoplasty depending upon the middle ear pathology. No complications during the surgery or the postoperative period were encountered. The patients were followed up at the ENT OP for from one to three months.

Results:

The Total number of patients with chronic ear discharge attending ENT OP was n=18,100 and the total number of patients admitted in ENT Department during the study period with intra and extracranial complications was n=40 which is 0.22 percent. Out of n=40 cases, n=22 were male and n=18 were females. The most involved age group was 0 – 10 years with 45% of cases depicted in table 1.

Table 1: Age distribution of complications of CSOM

Age	Male	Female	Frequency (%)
0 – 10	11	7	18(45)
11 – 20	5	3	8(20)
21 – 30	2	4	6(15)
31 – 40	2	2	4(10)
41 – 50	2	2	4(10)
Total	22	18	40(100)

The socioeconomic status of the cases was studied as per the Kuppaswamy scale. Out of n=40 cases, n=25(62.5%) cases were with lower socioeconomic status, n=8(20%) cases were with upper lower status, and n=7(17.5%), was with lower-middle socioeconomic status. Increase incidence in the first decade mostly extracranial complications due to low socioeconomic status, low hygiene, and low immunity. The laterality of involvement was recorded which showed

n=4(10%) cases with bilateral involvement n=24(60%) with right side involvement and n=12(30%) with left side involvement. The commonest complication was postaural abscess in n=22(55%) of cases increased incidence of postaural abscess in chronic discharge cases due to containment of middle ear disease with broad-spectrum antibiotics followed by *acute mastoiditis* in n=12.5% of cases other details of complication and distribution have been shown in table 2.

Table 2: Incidence of each complication

Complication	Frequency	Percentage
<i>Postaural Abscess</i>	22	55.0
<i>Bezolds Abscess</i>	3	7.5
<i>Acute Mastoiditis</i>	5	12.5
<i>Brain Abscess</i>	3	7.5
<i>Meningitis</i>	2	5.0
<i>Extradural Abscess</i>	1	2.5
<i>Facial palsy</i>	2	2.5
<i>Labyrinthitis</i>	1	2.5
<i>Sinus Thrombosis</i>	1	2.5

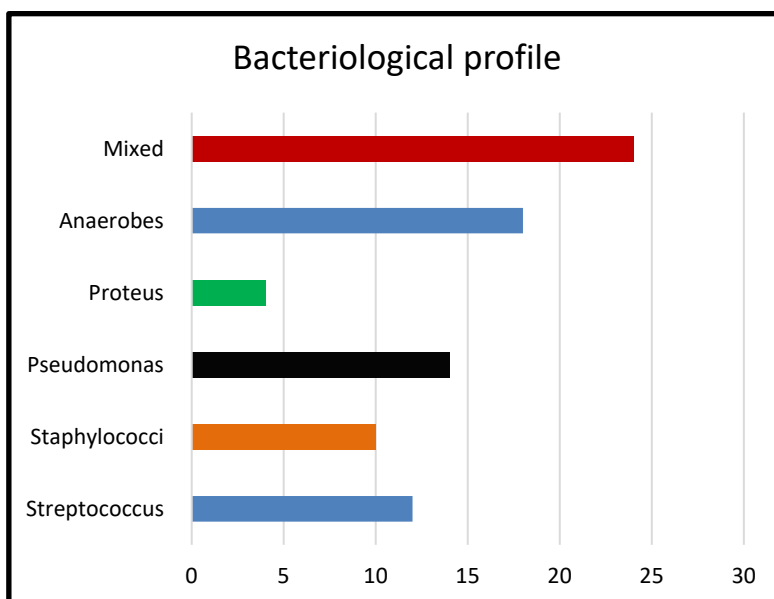
In this study, the duration of ear discharge was between 1 – 5 years in n=30(75%) of cases, and duration between 6 – 10 years was in n=8(20%) of cases and between 6 months and 1 year was in n=2(5%) cases. On clinical examination copious amount of discharge was in n=20(50%) cases, a moderate amount of discharge was found in n=9(22.5%) and scant discharge was in n=11(27.5%) of cases. The incidence of extracranial complication was recorded in n=33(82.5%) and intracranial

complications were found in n=7(17.5%) cases. The common pathology of the middle ear was granulations and cholesteatoma in n=18(45%) cases both were found in n=10(25%) and polyp were found in n=4(10%) of cases. Table 3 shows the equal incidence of complications in both central and posterior marginal and attic perforations with the equal role of cholesteatoma and granulation tissue and chronic middle ear infection

Table 3: Type of tympanic membrane perforation

Site	Frequency	Percentage
Attic	14	35
Posterior	8	20
Central	18	45
Marginal	4	10

The culture samples of the cases revealed the increased role of *Pseudomonas* and mixed aerobic and anaerobic infections in intracranial complications in chronic discharging cases depicted in Graph 1.



Graph 1: Bacteriological profile of cases with complications

X-ray mastoid Schuller's view revealed increased incidence of complications in sclerotic mastoids in n=22(55%) of cases and cellular mastoids in n=12(30%) of cases and acellular in n=6(15%) of cases. Table 4 shows cortical mastoidectomy for post aural abscess, modified and radical where hearing preservation and cholesteatoma are present respectively.

Death due to meningitis which is still the most common cause for the high mortality of all complications even in the present period was seen in n=1(2.5%). Death due to brain abscess was seen in n=1(2.5%) due to the patient's delay in seeking medical care. Rest n=38 cases were successfully recovered and followed up to 3 months postoperatively.

Table 4: Type of Surgical modality instituted

Surgery	Frequency	Percentage
Simple cortical mastoidectomy	17	42.5
Modified radical mastoidectomy	12	30.0
Radical mastoidectomy	9	22.5

Discussion:

Most of the patients in this study had a history of coryza, which might have led to negative pressure in the tympanic cavity which develops secondary to Eustachian tube dysfunction which leads to effusion with otitis media. In a few, however, the etiology is unknown. In the present case, a series of 45% of complications of CSOM occurred in the lower age group (0 - 10 yrs). This may be due to a short and straight Eustachian tube which bears the repeated infection in upper respiratory tract infection which goes for obstruction and otitis media and its complications. The second reason could be because young individuals have an immature immune system that is unable to defend against pathogenic organisms. MK Gupta et al.,^[16] in Uttar Pradesh found mostly involved age group with COSM was 11 – 20 years with 25% cases followed by 0 – 10 years with 15% cases. Some other studies in this field have also reported a higher prevalence of complications in the younger age group.^[17 – 19] In the current study n=25(62.5%) cases were with lower socioeconomic status, n=8(20%) cases were with upper lower status and n=7(17.5%), were lower-middle socioeconomic status. This may be due to poor living conditions and lack of adequate medical care or inadequate treatment. In a similar study Sengupta A et al.,^[20] found 60% of cases with COSM belonging to low socio-economic class. The common clinical presentation in the cases with complications was otorrhoea in 100% of cases followed by hearing impairment 75%, otalgia in 25% of cases similar clinical presentations have been reported by other series. The common pathology of the middle ear was granulations and

cholesteatoma in n=18(45%) cases both were found in n=10(25%) and polyp were found in n=4(10%) of cases.^[21-23] The incidence of extracranial complications was recorded in n=33(82.5%) and intracranial complications were found in n=7(17.5%) cases. Pawar SR et al.,^[24] reported 88.46% intratemporal complications and 11.53% intracranial complications. Postaural abscess occurred in 55% of cases and acute mastoiditis in 12.5% of cases was an important intratemporal complication of the present study. Brain abscess in 7.5% was a common intracranial complication in the current study (Table 2). Memon et al.,^[25] in their study also found brain abscess as the most frequent complication. Similar rates of complications were found in the study by Moustafa et al.,^[17] Grewal et al.,^[26] Bacteriological profile indicated growth of mixed, anaerobic, and *Pseudomonas* species in 35% of cases. VP Narve et al.,^[27] anaerobic organisms were isolated in 42.8% followed by *Proteus* species 35.7% and S Devi et al.,^[28] also have reported similar bacteriological profile in COSM cases of their study with complications. Surgical procedures employed in this series include Simple cortical mastoidectomy with the tympanic repair was done in 42.5% of cases. Modified radical mastoidectomy was done in 30% of cases and radical mastoidectomy was done in 22.5% of cases. All the operated cases were with an equal incidence of cholesteatoma and granulation tissue, in some, both were present and aural polyp showed in four cases showing the equal incidence of complications in non-cholesteatomatous cases.

Conclusion:

The present study found the rate of complications to be 0.22% of all COSM

cases reported to our hospital. With the advent of newer diagnostic modalities which include CRT/MRI, culture and sensitivity, and use of proper antibiotics and early interventions the incidence of complications can be still reduced. However, the only limitations are ignorance, poverty, and illiteracy which results in the delayed seeking of medical care contribute to the incidence of complications.

References

- Slattery W.H. Pathology and clinical courses of inflammatory disease of middle ear. In 5th edn. Ontario. BC Decker Inc 2003; p. 422-33.
- Kenna MA. Treatment of chronic suppurative otitis media. *Otolaryngol Clin North Am.* 1994; 27 (3): 457-72.
- Smith AW, Hatcher J, Mackenzie, I J, Thompson S, Bal J, Mac P, Okoth-Olende C, Oburra H, Wanjohi Z. Randomised control of chronic suppurative otitis media in Kenyan schoolchildren. *Lancet*, 1996; 348: 1128-33.
- Goycoolea MV, Hueb MM, Ruah C. Definitions, and terminology. *Otolaryngol Clin North America*, 1991; 24 (4): 757-761.
- World Health Organization. Chronic suppurative otitis media Burden of Illness and Management Options. Available at file:///C:/Users/pcc/AppData/Local/Temp/Chronicsuppurativeotitis_media.pdf [Accessed on 12/03/2021]
- Dhingra PL. Diseases of Ear, Nose and Throat. Elsevier publication New Delhi. Third edition. 2004; p. 97.
- Fairbanks D. Antimicrobial therapy for chronic suppurative otitis media. *Ann Otolaryngol-Head Neck Surg.*, 1981; 90 (3) (Suppl. 84): 58-62.
- Brook I, Frazier E. Microbial dynamics of persistent purulent otitis media in children. *J Pediatrics*, 1996; 128(2): 237-40.
- Brobbly GW, Zadik P. Bacteriology of otitis media in Ghana. *Tropical Doctor*, 1987, 17: 91-92.
- Aarhus L, Tambs K, Kvestad E, Engdahl B. Childhood otitis media: a cohort study with 30-year follow-up of hearing (The HUNT Study). *Ear Hear* 2015; 36:302–308.
- Yorgancilar E, Yildirim M, Gun R, Bakir S, Tekin R, Gocmez C, Meric F, Topcu I. Complications of chronic suppurative otitis media: a retrospective review *Eur Arch Otorhinolaryngol* 2013; 270: 69–76.
- Qureishi A, Lee Y, Belfield K, Birchall J. P, Daniel M. Update on otitis media – prevention and treatment *Infect Drug Resist* 2014; 7: 15–24.
- Dubey SP, Larawin V. Complications of chronic suppurative otitis media and their management *Laryngoscope* 2007; 117 264–67.
- Chew Y. K. Cheong J. P, Khir A, Brito-Mutunayagam S, Prepageran N. Complications of chronic suppurative otitis media: a left otogenic brain abscess and a right mastoid fistula. *Ear Nose Throat J.* 2012; 91:428–30.
- Sun J, Sun J. Intracranial complications of chronic otitis media *Eur Arch Otorhinolaryngol* 2014; 271 2923–26.
- MK Gupta, Ravi. Gupta Complications of chronic suppurative otitis media: A study in Azamgarh district Uttar Pradesh *International Journal of Health and Clinical Research.* 2021;4(8):226-28.
- Moustafa BE, Fiky El, Sharnousy MM. Complications of Suppurative Otitis Media: Still a problem in 21st century. *J Otorhinolaryngol Head Neck Surg.* 2009; 71:87-92.
- Agrawal S, Husein M, Mac Rae D. Complications of otitis media: an evolving state. *J Otolaryngol.* 2005; 34: S33-39.

19. KM. An unusual prevalence of complications of CSOM in young adults. *J Otolaryngol.*1992; 106:874-77.
20. Sengupta A, Anwar T, Ghosh D, Basak B. A study of surgical management of chronic suppurative otitis media with cholesteatoma and its outcome. *Indian J Otolaryngol Head Neck Surg.* 2010;62(2):171–76.
21. Edelstein Dr. Parisier SO. Haun JC. Acquired cholesteatoma in the pediatric age group. *Otolaryngol Clin N Am* 1989; 22: 955-65.
22. Shenoj PM. Management of chronic suppurative otitis media, In; Booth J ed., *Scott-Brown's Otolaryngology, Otolology, 5th edn, London: Butterworths, 1987;215-33.*
23. Hassan M. Clinical presentation of cholesteatoma (Dissertation) Bangladesh College of Physician & Surgeons, Dhaka 1993; 23 - 28.
24. Pawar SR, Shukla Y. A clinical study on complications of chronic suppurative otitis media and level of awareness in patients admitted at tertiary care hospital in central India. *Int J Community Med Public Health* 2015;2(3):223-27.
25. Memon MA, Matiullah S, Ahmed Z, Marafani MS. Frequency of un-safe chronic suppurative Otitis in patients with discharging ear. *JLUMHS.* 2008;102-15.
26. Grewal DS. Otogenic abscess- our experience. *Indian J Otolaryngol Head Neck Surg.*1995;47(2):106-12.
27. VP Narve, P Verma, V Verma. Clinical and Operative Study of Intracranial Complications of Chronic Suppurative Otitis Media (CSOM) and its Management. *JMSCR* 2019;7(9): 772-76.
28. S. Devi Prasad. V. Chandrasekhar, G Sreenivas, V. R Tagore, SB Amarnath, G. Pryanka. A clinical study of extracranial complications of chronic suppurative otitis media.